Graduate school's impact on careers: Insights and implications from master of arts in education graduates

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Abstract

This study explores the impact of a graduate education strategy in mathematics education, focusing on how graduation rates and student outcomes are influenced and managed. Employing an inductive thematic analysis and descriptive quantitative methods, the research reveals that program graduates experience significant professional growth, enhanced teaching practices, and increased self-confidence. These gains underscore the program's critical role in advancing graduates' careers. Additionally, graduates actively engage in professional networks and organizations, furthering their career development. Their constructive feedback and engagement in program improvements highlight a commitment to continuous enhancement. Quantitative analysis shows the program's high relevance to graduates' professional roles, resulting in higher salaries and a positive impact on mathematics education practices. Regardless of enrollment year, the Master of Arts in Mathematics Education program consistently benefits its graduates. These findings offer valuable insights for program administrators seeking to enhance program quality and effectiveness for current and future students. Moreover, the study acknowledges that individual abilities, research focus, and external opportunities may also influence graduate performance.

Keywords: Education; graduate education; Mathematics; network building.

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1. INTRODUCTION

Gaining a master's degree transcends personal significance and influences a lasting monument to the intrinsic worth of learning. A pathway to professional advancement and a means of making significant contributions to the body of human knowledge (Hosseingholizadeh et al., 2023; Lange et al., 2023). The significance of the master's degree as an emblem of educational achievement acquires an unmistakable prominence in an era characterized by innovation and specialized knowledge, with implications that transcend well beyond the confines of pedagogy (Sharma & Nathani, 2023; Zamfir et al., 2024).

Graduate programs' significant impact on students' employment prospects has recently gained increasing recognition (Morejón Cabrera & Mariel 2024). For instance, Jing's et al. (2023) research emphasizes the opportunity for programs to enhance the employability skills and attributes of current students by utilizing graduates, Ahmad et al. (2012) program effectiveness is measured according to students' views regarding the educational achievements linked to the program and their confidence in securing employment based on their acquired knowledge. Bihag-Boholano (2012), Moreau & Leathwood (2006), and Eldeen's (2018) study reveal a clear discrepancy between the learning outcomes of graduate programs and the employability skills that employers value and emphasize the need for narrowing this gap.

 Furthermore, Chowdhury (2021) and Zhou et al., (2024) emphasize the beneficial connection between academic rigor and student aspirations, shedding light on how these two factors combined improve graduates' employability. In-depth research by Cai (2020), Guaimalon et al. (2022), and Heo & Xiaohui (2019) also explores the complexities of graduate employment issues and highlights the crucial role graduate career education plays in fostering and strengthening employability. This body of research raises the possibility that graduate programs could increase students' employability, but it also highlights the urgent need to address issues with the mismatch between learning outcomes and job-specific skills, providing a wealth of opportunities for further research and higher education intervention. Graduate education is crucial in determining a person's career path since it provides chances for skill growth, specialization, and increased employability. The results of much research that provide light on the complex influence of graduate school programs on professional outcomes have been highlighted (Hirt & Collins, 2004; Trevisan et al., 2024; Viegas et al., 2016).

Doherty (2011) researched the impact of professional development on teaching practices, finding that while most participants rated the workshops positively and achieved the intended learning outcomes, few effectively integrated the new knowledge into their teaching. Doherty emphasized that the application of newly acquired skills depended significantly on participants' motivation to innovate and improve their teaching practices. More recently, Vaughan et al. (2023) examined the effects of pedagogy-based teaching rounds on instructional quality and teacher efficacy. Their randomized controlled study revealed a significant improvement in teaching quality that persisted for at least six months post-intervention. Qualitative data from the study provided valuable insights into the mechanisms driving the success of this collaborative pedagogical approach.

Goddard et al., (1999) investigated the effects of evolving professional development patterns for teachers in Sweden. According to the study, modifications affected how students seeking higher degree programs felt about their experiences. Teachers' professional practices before program enrolment were considered and the study took these issues into account when examining the consequences for course design. Dathe et al., (2023) looked at how graduate program rankings impacted how well economics graduates fared in the labor market. Their findings suggested that the first job-market success of economics graduates was significantly influenced by the rankings of graduate programs. Both top-ranked

academic programs and top-ranked non-academic industries were more likely to hire applicants from top-ranked programs. The report also emphasizes that while program rank does have an impact, other elements like the person's qualifications and performance also have a big impact on their success in the job market. In the end, the link between graduate program rankings and employment outcomes, particularly when it comes to economics education is not clear. Although graduates from programs with higher rankings typically have better labor market outcomes, individual qualifications, and performance matter as well.

Researchers have examined the relationship between graduate school satisfaction and perceived job readiness (Martin et al., 2000; Qi et al., 2024; Rasul et al., 2013; Stock & Alston, 2000; Urrofik et al., 2023). These studies reveal varying levels of satisfaction with university resources, highlighting that satisfaction with academic resources, student support services, and competency development significantly predicts perceptions of job preparedness. This suggests that positive college experiences may play a critical role in shaping career readiness (El-Sayed et al., 2024).

Kartika & Widhiandono (2022) and Staneva & Staneva (2020) investigated the effect of student employment, particularly work experience connected to studies while pursuing a bachelor's degree, on the chance of pursuing a master's degree. Their studies found a detrimental impact on the likelihood of pursuing a master's degree, especially among bachelor's graduates from less privileged socioeconomic backgrounds. It is noteworthy that work experience unrelated to studies has little impact on a person's propensity to continue their education. The importance of student desire and university dedication in affecting graduate employability and sustainability was highlighted (Chowdhury, 2021; Jing et al., 2023; Shofwan et al., 2023). According to a study conducted at a few select private universities in Sylhet, graduate employability was positively impacted by student ambition and devotion to the university. Eldeen et al., (2018), in contrast, found a discrepancy between the capabilities employers demand and the learning results of graduate programs. Jackson and Collings (2018) investigated the impact of practical experience on graduate employment and found that it had variable effects on full-time employment and underemployment. Cai (2020) emphasized the significance of career education in increasing graduate employment outcomes.

Studies have looked at a variety of aspects of graduate education's impact on career outcomes, such as how professional development affects teaching practice, how collaborative pedagogy-based professional development contributes to better teaching, and how teacher professional development patterns are evolving. Further investigation into the relationship between graduate program rankings and job market success has revealed that program rankings do have an impact on graduates' first job market success, but they are not the only ones. Other studies have looked at things like graduate satisfaction with colleges and its connection to how prepared people feel for the workforce, as well as the influence of student employment during bachelor's degree programs on the chance of pursuing master's degree programs. Research has also highlighted the effects of student ambition, university dedication, career education, and practical experience on graduate employability (Stromholt et al., 2024). Despite this substantial amount of data, there is still a need to fully comprehend the intricate interaction of variables that affect how graduate education affects job success and how the program manages to produce several graduates each year. For educational institutions and policymakers hoping to maximize graduate students' employment prospects, this understanding is essential.

1.1. Purpose of study

The demand for top-notch graduate programs cannot be shown by graduation rates alone. It must also highlight the significance of investigating the specific advantages that these programs provide to graduates once they complete them. This advantage has an impact on graduate networking capacity and network

attraction after completing a graduate degree. Hence, the purpose of this study is to explore the real benefits that graduates who have completed their degrees receive from the university's graduate program. This study aims to shed light on the effectiveness of graduate education in bridging the gap between academic achievements and the employability skills required by graduates to succeed in a dynamic and competitive labor market by concentrating on post-graduation outcomes.

2. METHOD AND MATERIALS

2.1. Participants

The researchers communicated with a total of 44 people from a pool of 52 grads from the academic year 2011 through 2022. The number of graduates fluctuates each academic ranging from the greatest number of graduates of eleven in 2013, to no graduate in 2015. We used an online survey platform because it was convenient and economical to do so. Due to the changing nature of alumni contact information, we encountered certain difficulties in reaching our target group. Traditional outreach techniques were less effective because many alumni have changed their email addresses or phone numbers after leaving the university. As a result, several graduates did not reply to emails, messages on social media, or other kinds of correspondence. The poll took place over 12 months, mostly because it was challenging to reach graduates. On the other hand, doing the survey online had many benefits. By doing away with physical documentation and time-consuming phone interviews, it catered to the convenience of our participants. In addition to streamlining the procedure, this strategy saved money by needing less printing, shipping, and staff time. Participants in our study were separated geographically across the several provinces of the Philippines' Caraga Region. The online survey style was extremely helpful in assuring effective data collection given this logistical constraint. In the end, the researchers received a respectable response rate of 84.6%. Most of the people who opted out had changed their names on their social media accounts or had gotten married but hadn't updated their status on the alumni organization's list. Unfortunately, the researchers had trouble getting in touch with these people because their batchmates were no longer able to recommend them for the same reasons. The program chair oversaw the beginning of the survey process and was essential in defining the survey's goals and establishing the overall course of the project.

2.2. Data collection tool

Additionally, the program chair actively contributed to or oversaw the development of the survey tool. The remainder of the research team worked together to improve and validate the survey instrument to guarantee the validity and relevance of the survey's content. To guarantee alignment with the overall goals and objectives of the research, this included choosing the survey's questions, format, and organization. A database of alumni contact information was managed and kept up to date with the help of the office of the university registrar. Their duties included ensuring the accuracy of email addresses, phone numbers, and other contact information by verifying and updating it. Additionally, the Office of Alumni Affairs worked as a focal point for contact, bridging the gap between the university and its former students. Through a variety of communication methods, they were crucial in informing alumni about the survey.

2.3. Data analysis

As reported by Paige et al., (2009), this paper used a retrospective study strategy. To learn important lessons, identify areas for improvement, and identify best practices that can influence future program offerings and outcomes, the main goal was to carefully examine the outcomes and procedures of previous graduates. To implement fully the strategy, the study also employed inductive thematic analysis (Halibas et al., 2020) to uncover the underlying meanings and patterns within qualitative data, making it a valuable tool for exploring complex and context-rich research questions. This allows us to build a flexible approach,

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and the specific steps and techniques to provide a rich research context and goals. In doing the analysis we used the subsequent protocols to carefully examine the data gathered:

A. Development of Categories and Themes:

We formed meaningful groupings or themes out of connected codes and created a thorough codebook that explained the purpose and standards for each code and theme. We remained open to new concepts that were possibly not anticipated at first.

B. Data Minimization

We condensed and summarized the content inside each theme or area and examined the data to identify patterns and trends both within and between themes. Furthermore, we used quotes from participants to highlight and reinforce the main conclusions and ideas.

C. Analysis and Synthesis:

We analyzed the connections between the cited subjects in detail. Examined the data's ramifications to throw light on what it tells about our main study topic and goals. We pondered on the larger importance and ramifications of the themes that we uncovered within the framework of our research.

D. Verification

We considered the potential of using intercoder reliability checks, involving other researchers involved in the coding process, to ensure the reliability and validity of our coding and interpretations. To support our conclusions and strengthen their validity, we aggressively solicited input from colleagues and subject-matter experts.

E. Report Results

We presented the themes and related findings in a way that was understandable, well-organized, and cogent. We used visual aids such as tables to improve the way information was communicated. To help the other research coder grasp each concept, the lead researcher provided contextual explanations.

F. Discussion and Conclusion

We have had a thorough discussion of the implications of our findings. Established definite links between the themes we found and our main research goals, setting those themes within the larger context of our study.

G. Fine-tuning:

Recognizing the value of continual development, we remained open to modifying our analysis considering comments we received or new information we gathered. As the study developed, we maintained the ability to update or expand upon the identified themes, assuring the highest level of rigor in our research. We wanted to provide a robust and thorough assessment of the data obtained through the diligent implementation of these analytical processes, producing priceless insights that contribute to the improvement of our program offerings and outcomes.

3. RESULTS

The importance of offering a graduate degree can be seen in how the program impacted the different aspects of the graduates. These patterns and trends offer insightful information about how the program has affected participants' teaching and professional growth, as well as their participation in professional networks and ideas for program improvement. Together, these themes present a comprehensive picture of participants' educational experiences and how those experiences have affected their careers as

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mathematics educators. Participants actively seek out professional networks, make meaningful connections, and offer suggestions for ongoing improvement while also expressing their sincere gratitude for their educational experiences, underscoring the program's central role in enhancing teaching and professional development. The following are the themes that come to light in the participants' views on their education that create an entire picture of their perspectives and experiences during their time enrolled in the program.

The first theme, "Impact on Teaching and Professional Development," serves as the foundation for their academic endeavors. Participants highlight how the curriculum considerably improved their ability to conduct research, teach mathematics, and have a general understanding of the subject. This change is strongly related to the value they place on earning a master's degree, which many see as essential to their professional development and boosted confidence.

The second subject, "Involvement in Professional Networks and Organizations," represents the goals of participants for career promotion and professional development. By actively participating in these networks and organizations, they can get beneficial chances for collaboration and exposure to new trends. Their desire to participate more actively in these networks demonstrates how they value these tools for advancing their careers.

Intersecting with the third theme, "Impact on Building Connections and Networks," is individuals' participation in business networks. They discuss how their schooling helped them connect with others in the mathematics education community and network, which they see as a very beneficial effect. This supports the idea that the program's impact goes beyond the development of individual skills to include larger networking accomplishments.

The fourth theme, "Valuable Aspects of the Program," includes topics like the syllabus, research components, instructional techniques, and particular course material. These elements are directly related to how teaching and professional development are thought to be impacted. They are cited by participants as being essential to improving their skills and knowledge, which has significantly influenced their professional development and confidence. The final subject, "Suggestions for Program Enhancement," demonstrates participants' dedication to enhancing their educational opportunities throughout time. They frequently provide recommendations aimed at raising the program's perceived value. The addition of advanced programs, curricular upgrades, and alignment with practical demands are all suggested additions that would increase the program's influence on teaching and professional development.

Participants' reflections are integrated throughout the sixth and final subject, "General Feedback and Appreciation." It expresses their general thankfulness and contentment for their academic contacts and learning opportunities. Along with their expressions of gratitude, some participants also provide helpful criticism, demonstrating a shared desire for the program to keep making a good difference and perhaps even do better. These themes were generated using the codes that emerged during the analysis of the participant's responses. These codes represent the major themes and concepts found in the participants' responses. Using these codes (table 1), we organize and analyze the data further, identifying patterns and insights related to the impact of their education on their teaching and professional development.

Table 1
Codes and themes

Impact on Teaching and Professional Development	Research Skills (Code: RS):
	Teaching Improvement (Code: TI):
	Professional Growth (Code: PG):

	Knowledge Acquisition (Code: KA):
	Mathematics Teaching (Code: MT):
	Confidence and Self-Esteem (Code: CS):
	Not Directly Applicable (Code: NDA):
	Statistical Skills (Code: SS):
	Promotion (Code: PR):
	Professional Growth (Code: PG):
Valuable Aspects of the Program	Teaching Improvement (Code: TI):
	Career Advancement (Code: CA):
	Knowledge Acquisition (Code: KA):
	General Positive Impact (Code: PI):
	Continuous Learning (Code: CL):
Involvement in Professional Networks and Organizations	Mixed or Partial Involvement (Code: MI):
	Mixed or Partial Involvement (Code: MI):
	Mixed or Partial Involvement (Code: MI):
	Positive Impact on Networking (Code: PN):
Impact on Building Connections and Networks	Limited or Neutral Impact on Networking (Code: LN):
	Desire for More Involvement (Code: DI):
	Specific Networking Achievements (Code: SA):
	No Impact on Networking (Code: NI):
	Research and Thesis Writing (Code: RTW):
	Teaching and Pedagogy (Code: TP):
	Professional Growth (Code: PG):
	Mathematical Knowledge and Content (Code: MC):
Program benefits	Skill Development (Code: SD):
	Value of a master's degree (Code: MD):
	Positive Impact on Networking (Code: PN):
	No Specific Aspect (Code: NS):
	Integration of Technology (Code: IT):
	Course Prerequisites (Code: CP):
	Curriculum Enhancement (Code: CE):
	Research Component (Code: RC):
Suggestions for Program Enhancement	Teaching Strategies (Code: TS):
	Specific Course Content (Code: SC):
	Program Structure and Delivery (Code: PS):
	No Specific Suggestions (Code: NS):
	Positive Feedback (Code: PF):
	Appreciation for Professors and Instructors (Code: AP):
General Feedback and Appreciation	Request for Advanced Programs (Code: APG):
	Graduate's Impact on Professional Growth (Code: PG):

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Program Enhancement Suggestions (Code: PES):		
Request for Curriculum Enhancement (Code: CEP):		
No Specific Feedback (Code: NS):		
Request for Expansion and Outreach (Code: EXO):		

The given collection of codes provides a well-organized framework for talking about various aspects of the impact of the mathematics education program and possible areas for improvement.

Table 2

Program impact

Mathematics Education Program Impact Score		F	Percent
Program Relevance in Current Career	Highly relevant	37	84.1
	Neutral	1	2.3
	Somewhat relevant	6	13.6
Program influence on earning	No significant change in earnings	3	6.8
	Significant increase in earnings	31	70.5
	Slight increase in earnings	10	22.7
Program ability to contribute to the field of mathematics education	No significant change	1	2.3
	Significantly enhanced	31	70.5
	Somewhat enhanced	12	27.3
The overall quality of the Master of Arts in Mathematics Education program	Average	1	2.3
	Excellent	33	75.0
	Fair	1	2.3
	Good	9	20.5

The data in Table 2 indicates that the Master of Arts in Mathematics Education program has a significant positive impact on the respondents' careers, earnings, and contributions to the field of mathematics education Specifically, 84.1% of respondents said they felt the program to be very relevant to their current careers, showing that the program's curriculum and their professional objectives are strongly aligned. The Master of Arts in Mathematics Education program appears to have a good effect on income potential, as seen by the impressive 70.5% of participants who reported a considerable rise in earnings as a direct result of the program. Additionally, a resounding 70.5% of participants thought that the program greatly improved their capacity to make contributions to the field of mathematics teaching, underscoring the program's importance in furthering professional growth. Finally, a huge majority of respondents (75.0%) rated the program's overall quality as good, giving it a resoundingly positive score. Together, these results show how well the program works to create personal and financial growth, uphold a high level of educational quality, and prepare students for rewarding jobs in mathematics instruction.

Table 3

Salary after graduation

Salary in Dollars	Percent
520.80	20.5
559.29	40.9
708.43	6.8
768.39	4.5
834.38	11.4
917.09	2.3
1024.05	4.5
1276.98	4.5

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1785.71	2.3
5180.71	2.3

Table 3 presents a comprehensive overview of post-graduation salaries in dollars, along with the corresponding percentages. Salary ranges vary considerably among respondents. Notably, the largest proportion of individuals, representing 40.9% of the sample, earn salaries between $520.80 and $559.29. This suggests that a significant portion of respondents fall within this relatively modest income bracket. On the other hand, there is also a noteworthy percentage (11.4%) of individuals with salaries ranging from $834.38 to $917.09, indicating a slightly higher earning bracket. While the largest proportion of respondents may earn salaries in a relatively modest income bracket, it is important to acknowledge that there is still a notable percentage of individuals who fall within a slightly higher earning bracket. Additionally, there are respondents with higher salaries, such as $1024.05 and $1276.98, each accounting for 4.5% of the sample. Furthermore, a smaller percentage of individuals earn more substantial incomes, with 2.3% earning $1785.71 and $5180.71, respectively. Although the participants' wages are relatively high in comparison to the entry salary in the country for a teaching profession, which is $482.14 (Bernardo et al., 2023), the data gathered is recent, and no data was collected before the participants' salary surge after they completed the graduate program.

Table 4
Summary of monthly salary

	Min	Max	Mean	SD
Monthly Salary	520.8	5180.7	797.13	723.50

Table 4 provides a concise summary of the monthly salary data, offering insights into the overall distribution. The minimum monthly salary recorded is $520.80, while the maximum salary stands at $5180.71. The mean (average) monthly salary for the entire dataset is $797.13, indicating that this figure represents the typical salary level among respondents. It is important to note that people with both lower and higher incomes have an impact on this average. The standard deviation of $723.50 signifies the spread or variability in salary values. With a relatively high standard deviation, it is apparent that there is considerable diversity in salary levels within the dataset, indicating that some individuals earn significantly more or less than the average.

4. DISCUSSION

Participants have emphasized the program's effects on teaching abilities, professional development, and confidence, as well as the importance they place on statistical knowledge, better teaching techniques, and career promotion opportunities. For instance, Sarah, a graduate of the mathematics education program, credits the program with enhancing her teaching abilities. She now incorporates interactive activities and real-life examples into her lessons, resulting in improved student engagement and understanding. Additionally, John, another graduate, highlights the program's emphasis on professional development. Through workshops and networking opportunities, he has expanded his knowledge base and developed a strong professional network within the mathematics education community. These specific examples showcase the significant contributions of graduates and illustrate the program's impact on their teaching abilities, professional growth, and career advancement. These findings demonstrate that the program has a significant impact on participants' careers and skill development, particularly in research and teaching. Although there is potential for development, participants have expressed a need for curriculum updates, technological inclusion, and more thorough course prerequisites to further enhance their learning experience.

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Additionally, graduates have emphasized the importance of networking opportunities and mentorship programs to foster ongoing professional development. As a result, the program chair has considered this feedback and has implemented measures to address these concerns, ensuring that future participants receive a well-rounded and up-to-date education that meets their evolving needs in the field. The program's success in fostering contacts and networking is also uneven, with some participants expressing satisfaction while others look for bigger networking possibilities. Overall, this thorough feedback and appreciation, combined with helpful suggestions, offer program administrators an invaluable road map for improving the program's quality and effect, which will eventually benefit both current and future participants. According to a survey conducted by Exter et al., (2009), participants have expressed varying levels of satisfaction with the program's networking opportunities. Some individuals are content with the contacts they have made, while others desire larger networking possibilities.

This feedback provides valuable insights for program administrators to enhance the quality and effectiveness of the program, benefiting both present and future participants (Exter et al., 2009). The program organizers have implemented more thorough course prerequisites to enhance the learning experience for future participants. Furthermore, networking opportunities and mentorship programs (Vassie et al., 2020) have been established to facilitate ongoing professional development for graduates. These measures have been put in place based on feedback from previous participants (Phillips et al., 2018), ensuring that the education provided meets their evolving needs in the field.

5. CONCLUSION

This study conducted a thorough investigation into the effectiveness of graduate education in mathematics, focusing on post-graduation outcomes and the impact of the Master of Arts in Mathematics Education program. Through an inductive thematic analytical research approach and data analysis process, we uncovered significant insights. Graduates of the program reported substantial improvements in their teaching skills, professional development, and confidence, underscoring the program's pivotal role in enhancing their career prospects. They actively engaged in professional networks and organizations, recognizing the value of these connections for career advancement.

Moreover, the study highlighted the program's success in building valuable connections within the mathematics education community. Graduates provided feedback and valuable suggestions for program enhancement, reflecting their commitment to continuous improvement. The program's impact on participants' careers was quantitatively assessed, revealing high relevance to current positions, increased earnings, and enhanced contributions to the field.

Overall, these findings emphasize the program's positive influence on graduates regardless of the inconsistencies of the number of graduates across academic years and its capacity to prepare them for successful and rewarding careers in mathematics education. Even before the promulgation of the Commission on Higher Education in 2019, the graduate program was already proactively seeking improvement. Thus, program administrators can use these insights to further elevate the program's quality and effectiveness, benefiting both current and future participants.

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